Partnering for the Future:

A Strategic Plan for California's Public Safety Radio Communications

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Executive Summary

California's 10 largest public safety agencies provide law enforcement, fire protection, emergency response, transportation management, flood control, detention, rehabilitation and other public safety services to over 32 million residents and 44 million visitors each year. For these agencies, immediate access to information is fundamental to their ability to protect life and property. For those in the field, mobile radio communication is the primary, and sometimes only link to information and resources during both routine and emergency operations.

In the State of California, lack of effective and reliable radio communications is impeding state public safety agencies' ability to perform their most elemental mission: the protection of life and property.

Lack of effective and reliable radio communications is impeding public safety's ability to protect life and property

Each of California's state public safety agencies operate and maintain largely independent radio systems. Lack of interoperability, channel congestion, aging equipment and limited functionality are crippling these systems. Without effective and reliable public safety radio communications, Californians, and those sworn to protect them, are put at significant risk.

The State of California faces a unique window of opportunity to make desperately needed improvements in public safety radio. Increasing competition for spectrum resources, new regulations governing wireless communications, rapidly changing technologies and rising costs quickly are narrowing that window of opportunity.

The collective desire to take advantage of this narrowing window of opportunity has led California's 10 largest state public safety agencies and the Department of General

Services to initiate a collaborative effort to develop a statewide strategy for public safety radio communications. The agencies include:

- Department of California Highway Patrol
- Department of Corrections
- Department of Fish and Game
- Department of Forestry and Fire Protection
- Department of Justice
- Department of Parks and Recreation
- Department of Transportation
- Department of Water Resources
- Department of the Youth Authority
- Governor's Office of Emergency Services

Recognizing the potential benefits of partnering together, a Public Safety Radio Strategic Planning Committee comprised of representatives from each of these agencies was established in December 1994. This Committee directed the collaborative effort that produced *Partnering for the Future: A Strategic Plan for California's Public Safety Radio Communications*.

Vision for the Future

Radio communication inarguably is one of the most essential tools public safety service providers depend upon daily. A robust public safety communication infrastructure is a critical component of the State's public safety mission. It is an enabler to a safer, healthier and more prosperous California. Thus, California's state public safety agencies have framed a common vision in which modern mobile communication technology continues to enhance the delivery of public safety services well into the 21st century.

To achieve this vision, California must move rapidly and decisively to meet targeted goals for universal statewide access, improved interoperability, enhanced functionality, and adequate channel availability.

Competing Paradigms

There are several alternative paradigms to improving the State's radio communication systems. The State can choose to continue its present individually developed and funded departmental radio operations, or the State can elect to meet its strategic goals for public safety radio by making significant investments in communication infrastructure.

The total 15-year costs for continuing present operations are estimated at $1 billion. Even at this level of expenditure though, the State of California still will have inadequate communication systems that no longer support the most fundamental needs of public safety agencies. Increasingly, field personnel are put in life-threatening circumstances with no reliable communications. Public safety is compromised as a lack of interoperability translates into delayed response times to emergency incidents. Simply upgrading existing systems which are bordering on obsolescence and unable to accommodate future growth, would entail major expenditures without concomitant benefits.

Significant investment is required to rescue deteriorating systems.

It is clear that significant investments in radio technology, infrastructure and user equipment are required to rescue California's deteriorating communication systems. Meeting the current needs of state public safety in this current paradigm of independent procurement and development would require funding each agency independently to replace aging and obsolete voice system infrastructure, procure additional equipment necessary to equip those field officers currently without radio communications, and implement statewide mobile data capabilities. It is anticipated that approximately $3 billion over 15 years would be needed to meet these minimum requirements.

This high cost exceeds agency resources. Additionally, each of the agencies would face the challenge of acquiring additional spectrum without demonstrating to the Federal Communications Commission a commitment to shared systems or use of radio frequencies. It is unlikely the required spectrum could be acquired through these independent pursuits. A shift in paradigm is required.

Making coordinated investments in shared radio systems, represents a dramatic departure from today's approach to public safety communications. Shared communication systems provide the most reliable means of achieving direct interoperability among multiple agencies. Larger numbers of users make implementing enhanced features such as mobile data more cost effective. Shared systems offer greater opportunities to achieve cost efficiencies through the reduction of duplicate infrastructure, streamlined maintenance structures and greater leverage in equipment procurements. Additionally, by demonstrating to the Federal Communications Commission a commitment to shared systems and efficient use of frequencies, California will increase its chances of acquiring the additional necessary spectrum resources.

A Strategy for the Future

California's strategy for realizing the vision defined in this Strategic Plan is founded on a commitment to partnership. Only through strong partnerships will the State's vision become possible. State agencies, private industry and local public safety will all play significant roles in California's future public safety wireless communications environment.

The partnership among state agencies established with this collaborative strategic planning effort must be maintained to achieve operational advantages in the future. Even the largest agencies can no longer afford comprehensive communication solutions alone. By making significant, coordinated investments in shared public safety radio communication systems both the unique, as well as the common requirements of the 10 participating agencies will be met most efficiently.

Only through strong partnerships can the State's vision be realized

While no private provider cost effectively offers the level of reliability, coverage, priority access and security that California's state agencies require from their primary radio communication systems, commercial services do play an important role as an adjunct to public safety communications. Commercial services, including cellular and paging, will continue to provide public safety personnel with added flexibility and cost effective solutions to secondary communication requirements.

Californians will benefit from more efficient and coordinated emergency response only when public safety at all levels of government can effectively communicate during daily operations as well as major disasters. This will require a partnership among state and local public safety agencies. The State of California can support interoperability with local agencies by continuing to maintain state mutual aid radio systems and providing gateway capabilities to selected local systems. In addition, although the new shared system will be optimized to meet state agency requirements, there may be future opportunities for local agencies to share in the use of the system.

Recommendations

The State of California should move quickly and decisively to begin the phased implementation of shared, statewide public safety voice and data radio communication systems. These systems should be designed to consist of multiple voice and data networks optimized to meet the unique requirements of the 10 participating agencies, as well as common requirements. These sub-systems may utilize multiple technologies and spectrum bands, maximizing spectrum efficiency and leveraging existing infrastructure investments wherever possible. The State should begin immediately to pursue the additional spectrum that will be required to support shared

systems. Interoperability with existing mutual aid systems should be maintained, and specialized requirements should be met on a case-by-case basis, utilizing commercial providers where most cost effective.

California should maintain ownership of it shared systems, distributing administrative control to user agencies. The State should work closely with vendors during design and installation phases, and develop standards for site and facility management. The Planning Committee should be established as a permanent radio communications advisory body to the Department of General Services to contribute to strategic directions, system administration, defining user requirements and priority setting.

The Department of General Services should continue to provide system maintenance and support services. Department staff should be provided ongoing training and updated equipment to maintain the required level of expertise. Formal project tracking procedures should be implemented and improvements in the procurement process should be pursued. In addition to its maintenance responsibilities, the Department should expand its efforts to elevate public safety communications as an issue on national agendas, becoming an advocate for its client agencies in national planning forums.

The State should appoint a full-time project manager to manage the design and installation of the new shared systems. Ad hoc task forces of user agency and Department of General Services representatives should be established to staff specific tasks, including funding, spectrum acquisition and detailed system design. Outside assistance should be retained to supplement staff and to provide specialized expertise as required.

Critical Success Factors

There are several factors critical to the success of the strategic vision outlined in the report. To ensure success, the State must:

- Commit to Long-Term Interagency Participation
- Establish Long-Term Funding
- Redefine the Role of Department of General Services Telecommunications Division
- Establish Processes for Requirements-Driven Justification
- Provide Comprehensive Training
- Update Operational Processes and Procedures
- Continue Operational Autonomy and Flexibility
- Seek Opportunities for Local Participation
- Continuously Communicate Project Goals and Risks

Action Plan

Thus, to maintain the cooperative planning momentum achieved over the past year and to seize the narrowing window of opportunity within the next 18 months, California should:

1. Communicate the Strategic Plan to Stakeholders
1. Prepare Feasibility Study Report (FSR)
2. Pursue Spectrum Allocation
3. Develop a Funding and Finance Strategy
4. Review Evolving Committee Roles and Responsibilities
5. Finalize System Design and Prepare Specifications

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The State of California faces a clear challenge to replace its aging, nearly obsolete public safety communication systems. In an unprecedented, collaborative effort to meet this challenge, California's 10 largest public safety agencies partnered to create a shared vision and define a strategy for the future. This vision will direct California into a new century with enhanced public safety services supported by effective, reliable mobile radio communications.

A Compelling Case for Change

In the State of California, lack of effective and reliable radio communications is impeding California's state public safety agencies' ability to perform their most elemental mission: the protection of life and property.

California's 10 largest state public safety agencies provide law enforcement, fire protection, emergency response, transportation management, flood control, detention, rehabilitation and other public safety services to over 32 million residents and 44 million visitors each year. For these agencies, immediate access to information is fundamental to their ability to protect life and property. For those in the field, mobile radio communication is the primary, and sometimes only link to information and resources during both routine and emergency operations.

Lack of effective and reliable radio communications is impeding public safety's ability to protect life and property

Mobile radio communication provides a vital lifeline, connecting over 43,000 state public safety radio users to assistance or back-up during emergencies and disaster situations. It provides routine access to critical resources such as dispatch and criminal justice information, highway conditions, flood levels, wildfire status and other crucial information. Radio communication enables dispatchers to direct mobile units to the scene of an accident and allow firefighters to warn each other of impending danger at fires. During major emergencies such as earthquakes, riots or floods, radio communication is vital to coordinating resources and providing command support.

Today however, California's state public safety radio systems are failing, and public safety is compromised as a result.

Existing Systems Failing

Each of California's state public safety agencies currently operates and maintains largely independent radio systems. Lack of interoperability, channel congestion, aging equipment and limited functionality are crippling these systems.

Lack of Interoperability

State public safety agencies lack the ability to communicate effectively with each other and with other federal and local public safety agencies.

The increasing complexity, size and frequency of disasters and emergency incidents are escalating the requirements for coordinated multi-agency response among different levels of government. For example, during 1995, all 58 counties in the State declared states of emergency at the same time. Federal, state and local agencies were called upon to coordinate disaster response, fire suppression, flood control, law enforcement, traffic management and other public safety services. Although effective interagency communication is an essential component of these cooperative efforts, the separate and often incompatible radio systems created a technological environment in which it was often difficult, and at times impossible, for agencies to effectively communicate with one another.

Separate and incompatible systems create a technological environment in which it is often impossible for agencies to communicate

The acquittal in April 1992 of four Los Angeles police officers after the beating of Rodney King sparked an unprecedented incidence of rioting, arson and looting in the Los Angeles area. As events escalated, over 9,000 federal, state and local law enforcement as well as military personnel, including 1,700 California Highway Patrol officers, mobilized to assist the City of Los Angeles. These public safety officials battled 3,600 structural fires and arrested more than 3,000 people in the three days of rioting. Incompatible radio systems required some field personnel to carry three or more radios for resource coordination, and left some officers with no interagency communications. This inability to communicate among responding agencies put first responders at risk and may have contributed to the significant number of casualties. At least four police officers and three firefighters were shot and hundreds more were injured. Thirty-eight civilians also were killed and 1,250 more injured.

The impact of incompatible systems extends beyond high profile incidents and disasters. Less dramatic, routine state agency operations also are compromised. In December 1994, the Departments of Fish and Game, and Parks and Recreation jointly responded to a fatal mountain lion attack. Without direct radio interoperability, communication between rangers and wardens in the field was limited to sending messages through dispatchers who then communicated through the public switched

telephone network in southern California. This circuitous communication route caused significant delays in coordinating a response.

The 10 agencies currently operate in every available frequency band allocated for public safety use, including Very High Frequency (VHF) low and high bands, Ultra High Frequency (UHF) and 800 MHz frequencies. Radio users operating in one frequency band cannot talk to users operating on a different band. As a result, communication among state agencies, and sometimes among different divisions within the same agency, can be severely restricted. The Department of Corrections operates primarily on 800 MHz frequencies within the state institutions, while its Transportation Unit operates on a lower frequency band. Consequently, there is frequently no communication between institutions and transportation vehicles when inmates are transported throughout the State.

Channel Congestion

Congestion on existing voice radio systems often leaves field personnel waiting several minutes to access an available channel.

Antiquated systems and aging equipment have translated into reduced reliability and increasing obsolescence

Many of the 10 agencies are currently operating near, and in some cases exceeding, the capacity of their existing communication systems. Radio spectrum allocated for public safety has been fully assigned in most urban areas of California; there are no additional channels available. As a result, many agencies have turned increasingly to private communication providers for cellular telephones, pagers and other communication devices. These services alone however, are insufficient. Inadequate coverage, lack of priority access and no security provisions make these commercial options more suited for secondary, administrative communication than an incident or emergency response.

When the nation's worst firestorm in almost a century raged in Berkeley and Oakland Hills in October 1991, firefighters from more than 50 federal, state and local departments, including the California Department of Forestry and Fire Protection, joined to battle the blazes. At the height of the fires, radio communication was often impossible. Congestion caused by too many radio units on the same channel and too few available mutual aid channels jammed communications. As a result, communication among cooperating agencies was often limited to face-to-face interaction. After-action reports cited the problems with radio communications as a contributing factor to the endangerment of firefighters and the extent of damages. The Oakland Hills fire took 25 lives, injured 150, destroyed over 3,000 homes and exceeded $1 billion in losses.

Aging Equipment

Antiquated systems and aging equipment inventories translate into escalating maintenance costs, reduced reliability and increasing obsolescence for some state public safety agencies.

The majority of the State's existing voice radio systems rely upon 30 year old technology. Much of the system infrastructure was installed over 10 years ago. Over 50 percent of the State's 53,000 fixed, mobile and portable radios are at or nearing the end of their useful life and will require replacement within the next four years.

The Department of California Highway Patrol's existing radio communication system is facing imminent obsolescence. The Department can no longer obtain radio equipment from major equipment manufacturers. The loss of vendor support will impact the ability to provide even the most basic radio communication between officers and dispatchers in the next few years.

The loss of vendor support will impact the ability to provide even the most basic communication capabilities

Limited Functionality

The lack of commonly available mobile data communication and video transmission capabilities in the field significantly impairs the effectiveness and safety of public safety personnel during routine and disaster situations.

Advances in data and video communication technologies are providing a wealth of new capabilities and applications that can substantially aid public safety personnel in the performance of their duties. The California Highway Patrol is pilot testing mobile laptop computers for field reporting and database inquiries such as wants and warrants. The Department of Justice utilizes wireless, remote video during selected surveillance operations. The use of these technologies, however, is still limited.

On January 17, 1994, the nation's most damaging earthquake since 1906 hit the San Fernando Valley. One of the most significant incidents in terms of loss of life occurred when a three-story, 120 unit apartment complex collapsed. Involved in rescue operations were Urban Search and Rescue teams from several counties and the Governor's Office of Emergency Services. Advanced data communication technologies could have aided this and similar efforts in the affected areas by making floor plans, resource lists, damage assessments and other critical information instantly available on-scene.

The Northridge earthquake also caused major freeway damage up to 32 kilometers from the epicenter. The Department of Transportation could have effectively used advanced video communication technologies to remotely assess damage, monitor freeway conditions and detour motorists appropriately.

Risks of Deteriorating Communications

Without effective and reliable public safety radio communications, Californians, and those sworn to protect them, are put at significant risk.

Endangerment of Field Personnel

Public safety field personnel rely upon their radios to request assistance or back-up in emergencies. They also rely on radios for alerts to life-threatening incidents and conditions. As continuing deterioration compromises radio communication systems across the State, the safety of field personnel during day-to-day and emergency operations increasingly is jeopardized.

Lower Levels of Service

Seconds often separate life and death during emergencies and disasters

As existing communication systems become overcrowded and compromised by age, the State's public safety agencies lose their ability to effectively communicate with dispatch and other field personnel. Without coordination, response times lengthen and multi-agency responses become confused and inefficient. Where seconds often separate life and death during emergencies and disasters, this can result in significant casualties and additional destruction of property.

Obsolescence

Existing systems already are becoming obsolete as manufacturer support is discontinued for aging systems and equipment operating in the lower portion of the frequency spectrum. In addition, federal initiatives and potential mandates to achieve spectrum efficiencies will result in manufacturers discontinuing support for equipment using less efficient technologies. Most of California's existing systems will become obsolete within the next 10 years.

Inability to Support Future Growth

California's population is expected to increase nearly 14 percent to approximately 37 million by 2006. Over the next 10 years, the number of state public safety radio users is expected to steadily increase to over 51,000 individuals to accommodate this anticipated growth in demand for service. The majority of California's current communication systems are now operating at, or exceeding, capacity. Without additional spectrum resources or a migration to newer spectrum efficient technologies, these systems will be unable to accommodate California's future growth.

A Narrowing Window of Opportunity

The State of California is facing a unique window of opportunity to make desperately needed improvements in public safety radio communications. Increasing competition for spectrum resources, new regulations governing wireless communications, rapidly changing technologies, and rising costs quickly are narrowing that window of opportunity.

Competition for Spectrum Resources

Wireless communication simply is not possible without adequate radio frequencies. Today, in many urban areas of the country, the demand for these spectrum resources is exceeding availability. Even so, the demand for additional spectrum is expected to double in the next 10 years as the population increases and demand for commercial services such as personal communications, paging and mobile data rise. To benefit from this unprecedented demand, the federal government continues to look for opportunities to auction spectrum to meet budget shortfalls. Already, spectrum auctions to commercial Personal Communications Services providers have forced California to move portions of the existing microwave system off currently used frequencies. The public safety community cannot afford, nor should it be forced to participate in, these spectrum auctions.

Today, public safety allocations represent less than 10 percent of the total land mobile radio spectrum managed by the Federal Communications Commission. In the future, as the numbers of private individuals utilizing cellular telephones, paging and other personal communications services increase, public safety will compete increasingly with commercial users for additional spectrum. In September 1996, the Public Safety Wireless Advisory Committee, established by the Federal Communications Commission and the National Telecommunications and Information Administration to evaluate the wireless communication needs of public safety, submitted its *Final Report*. In this report, the Committee concluded that public safety requires an immediate 25 MHz of new spectrum allocations to support current operations. By the year 2010, as much as an additional 70 MHz may be required to support voice and data, as well as image and video communications. In addition, the Committee concluded that 2.5 MHz of spectrum is required to support interagency interoperability.

In its *Final Report*, the Public Safety Wireless Advisory Committee also strongly encouraged efforts to share or consolidate radio systems to make more efficient use of limited spectrum resources. The allocation of new radio frequencies will, in part, become contingent upon an ability to demonstrate this spectrum efficiency. California's state public safety agencies can greatly increase their chances of acquiring new spectrum allocations by joining together in the shared or joint use of frequency allocations. In fact, acquiring the needed spectrum resources for future operations may well be impossible without this demonstrated commitment to spectrum efficiency.

Changing Regulations

This increasing demand for radio spectrum has led the Federal Communications Commission to undertake several initiatives aimed at achieving more efficient use of existing resources. Spectrum efficiencies however, will require new technologies to meet the associated federal mandates regulating the design of new communication systems. In February 1995, the Commission issued the Refarming Report and Order. Refarming attempts to narrow existing radio channels, thus creating open or green space between channels and making it available for new allocations. For public safety in California, the challenge will be to keep up with the pace of changing technologies required to support new narrower radio channels, and comply with new regulations governing refarming, and other federal initiatives.

Public safety will compete with commercial users for new spectrum

New Technologies

A wide range of new mobile radio communication services will be introduced as wireless technologies dramatically reshape the communication and information infrastructure of the United States over the next five to 10 years. The long-term nature of technology investment is changing. The design and manufacture of new technologies, and the discontinuance of support for others, often force public safety agencies into technology investments as existing systems become obsolete. California state agencies must continuously evaluate new technologies based on compatibility with existing radio systems, interoperability with other systems and their ability to cost effectively enhance the delivery of public safety services.

Rising Costs

Increasing competition for spectrum resources, new federal mandates regulating the design of communication systems and the introduction of new, more complex technologies have all contributed to the increasing costs of wireless technologies. While California's state public safety agencies demand statewide coverage and enhanced functionality, even the largest agencies cannot afford such solutions alone. Where once public safety agencies could pursue independent solutions to their communication needs, they are now challenged to explore alternative approaches and achieve greater cost efficiencies. Consolidated systems, partnerships with private industry and outsourcing now need to be considered and analyzed as viable alternatives to the traditional single agency ownership of communication systems.

The long-term nature of technology investments is changing

Nationwide, states are challenged to meet these new wireless communication requirements and provide for emerging mobile radio technologies. As part of California's strategic planning effort, a national survey was conducted to compile the best practices in statewide radio communication systems planning and implementation. Of the 39 states that responded to the survey, all but 12 are planning for or implementing shared, consolidated statewide voice radio systems to meet these common challenges. Additionally, eight states are already underway with the implementation of mobile data communication systems, and 12 more are planning to implement mobile data capabilities within the next three years.

California's Response

Recognizing the need to take advantage of this narrowing window of opportunity, the State's 10 largest public safety agencies and the Department of General Services Telecommunications Division initiated a collaborative effort to develop a statewide strategy for public safety radio communications. These agencies include:

- Department of California Highway Patrol
- Department of Corrections
- Department of Fish and Game
- Department of Forestry and Fire Protection
- Department of Justice
- Department of Parks and Recreation
- Department of Transportation
- Department of Water Resources
- Department of the Youth Authority
- Governor's Office of Emergency Services

Recognizing the potential benefits of partnering, a Public Safety Radio Strategic Planning Committee comprised of representatives from each of these agencies was established in December 1994. This Committee directed the collaborative effort to define this cohesive statewide strategy for public safety radio communications.

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The critical problems crippling California's public safety radio systems present a compelling case to move toward a new shared vision for the State's future communication infrastructure.

A Vision for Public Safety Radio

Radio communication is inarguably one of the most essential tools public safety providers use in their daily efforts. A robust public safety communication infrastructure is a critical component of the State's public safety mission. It is an enabler to a safer, healthier and more prosperous California. Thus, California's state public safety agencies have framed a common vision in which modern mobile communication technology continues to enhance the delivery of public safety services well into the 21st century.

To achieve this vision, the 10 participating agencies have defined the following strategic goals for public safety communications in the State of California. It is the goal of these agencies to leverage existing investments in infrastructure to ensure universal statewide access, improve interoperability, enhance functionality, and provide adequate channel availability.

Universal, Statewide Access

The terrain patrolled by public safety personnel includes metropolitan freeways, redwood forests, coastal beaches, and the mountain and desert regions from the tallest mountains in the continental United States to America's lowest point in Death Valley. Many public safety personnel frequently patrol the most remote of these areas alone. Basic communication capabilities must be available to every public safety service provider as he or she travels throughout the State during both routine and disaster operations. Reliability, statewide coverage, universal access to dispatch and affordability are necessary to provide state public safety agencies with universal, statewide access to radio communications.

Reliability

Public safety agencies require reliable communication systems which are engineered and maintained to withstand natural disasters and other emergencies. In addition, antiquated infrastructures and aging equipment must be replaced to avoid compromising the reliability of systems. Currently, over 70 percent of fixed base station equipment operated by the Office of Emergency Services is more than 15 years old and requires replacement. The California Highway Patrol's existing radio communication system requires wholesale replacement as major manufacturers have discontinued support for low band spectrum technology.

Radio communication is one of the most essential tools used by public safety providers

Coverage

Mobile radio coverage is required to support operations that travel through diverse terrain and multiple service areas. Portable radio coverage is required to support public safety operations that extend out to remote areas and inward through urban canyons, concrete buildings and basements. The Department of Water Resources requires radio communications to support in-facility operations 60 feet below ground. Radios must be designed to be operational around loud motors, high voltage pumps and through thick concrete walls. Additionally, the Departments of Corrections and the Youth Authority require both portable radio coverage inside correctional facilities designed with layers of concrete and few or no windows, and wide area coverage for transportation units and work crews that travel statewide.

Universal Access to Dispatch

Public safety radio users require universal access to dispatch services. Dispatch services are critical to coordinating field resources, providing access to criminal justice and other information, and linking field personnel with assistance during emergencies on disaster situations. Several state agencies currently rely on local law enforcement agencies for dispatch services after-hours and in less densely populated areas of the State. Because a state agency's radio traffic is a secondary function of the assisting local dispatch center, and since the state agency's equipment often is not integrated into the dispatcher's primary workstations, dispatching for the state agency can be relegated to a significantly lower priority. As a result, field personnel are left with inconsistent levels of dispatch support, or worse, with no response to their requests for back-up.

In 1981, California State Legislature asked the Departments of Fish and Game, and Parks and Recreation to assess alternatives to this approach to providing dispatch services. Both departments concluded that relying upon local agencies during peak activity periods risked the safety of field personnel and compromised routine and emergency operations. Fifteen years later, the Department of Fish and Game and other state agencies continue to rely on local agencies for dispatch services in many areas of the State.

Affordability

Increasing costs of technology and the growing need for government to do more with less has made acquiring the necessary funding for capital improvements exceptionally difficult. No state agency will have access to the selected communication solutions unless it is affordable. Communication systems must be cost efficient with respect to both one-time procurement costs and recurring maintenance costs. Replacement parts and components must continue to be available through the system's expected lifetime.

Improved Interoperability

The ability to communicate between and among public safety agencies is fundamental to the effective protection of life and property. Traffic accidents frequently require the coordinated resources of the California Highway Patrol, Department of Transportation and other state and local agencies. Wildland fires often demand the joint response of the Department of Forestry and Fire Protection, Parks and Recreation, Office of Emergency Services, inmate work crews from the Departments of Corrections and the Youth Authority, and other public safety agencies. Interoperability among separate radio communication systems is critical to public safety's ability to coordinate effective responses to these and other life threatening incidents. Today however, interoperability is hampered by the use of proprietary technologies and the diversity of radio spectrum in which public safety agencies operate. Future interoperability will require both technology dependent and technology independent solutions.

Technology Dependent Solutions

The State must move rapidly and decisively to meet objectives

Technology dependent solutions utilize dedicated equipment to establish a link between two or more separate communication systems. Gateways are one technology that may provide a viable short-term solution to interoperability. They can interconnect systems operating in different frequency bands, modes of operation and manufacturer protocols. Broad band, dual-band and multi-band radios are a second potential solution to achieve interoperability among multiple spectrum bands; however, commercial availability is currently limited. The disadvantage of technology dependent solutions is that interoperability fails when equipment such as gateways and multi-band radios are damaged or otherwise inoperable.

Technology Independent Solutions

Technology independent solutions achieve interoperability by providing a common communication path to all radio users. The mutual aid systems maintained by the State provide common frequencies for use during disasters and other multi-agency

responses. Shared or consolidated systems allow multiple agencies to operate in the same frequency band using compatible equipment on the same infrastructure. Technology independent solutions are being implemented nationwide. In California, San Diego and Imperial Counties are demonstrating early successes with the implementation of a consolidated regional communication system supporting nearly 60 federal, state and local agencies.

Enhanced Functionality

While voice radio communication remains the primary form of information transfer among public safety agencies today, data and image transmissions will account for a majority of all public safety communication by 2010. Increasingly, state agencies will rely upon mobile data communication and video transmission technologies to increase the safety, efficiency and productivity of field personnel.

Mobile Data

The California Highway Patrol is pilot testing mobile laptop computers for database inquiries, automatic status updates and field reporting. In the future, mobile data may be required to support such federal initiatives as the Integrated Automatic Fingerprint Identification System (IAFIS) and the National Crime Information Center (NCIC) 2000 project. These and other emerging applications will allow law enforcement and other public safety professionals to check fingerprints, outstanding wants and warrants, and other critical information instantly.

Data will account for a majority of all public safety communications by 2010

Video Transmission Technologies

Increasing frequency of high risk incidents such as narcotics surveillance operations, prison riots and public disturbances have increased for all public safety agencies the requirement for video transmission technologies. The implementation of Intelligent Transportation System (ITS) applications will require the Department of Transportation to rely more and more on video as well as data technologies. Additionally, the Department of Forestry and Fire Protection requires remote video of wildland fires to provide incident commanders accurate, real-time information with which to make resource decisions.

Channel Availability

In California, radio spectrum congestion and interference cause some public safety personnel to wait several minutes to access a voice communication channel. The Department of Justice currently avoids simultaneous surveillance operations in some areas of southern California due to the lack of available channels to support more

than one task force. Additional spectrum, greater spectrum efficiencies and system expansion are required to ensure California's public safety personnel have immediate access to communication channels.

Additional Spectrum

Spectrum is congested in many areas of the nation as well as throughout most of California and few choices remain. Even so, the demand for spectrum is expected to double in the next 10 years as the population increases and demand for commercial services such as personal communications and paging rise. In California, additional spectrum is needed to reduce the current congestion of public safety voice channels in California and ensure that field personnel have available communications during emergencies as well as routine operations. Due to propagation characteristics, equipment availability and the need for interoperability, spectrum from 150 MHz to 870 MHz is currently considered the ideal range for public safety mobile and portable communications. Unused UHF television channels offer one opportunity to meet this need. Formally allocated to broadcast television, portions of the 470 to 512 MHz band (TV channels 14-20), are currently licensed for land mobile use in 13 urban areas. Extending the assignable area for these channels from the urban areas where it is presently permitted may provide additional spectrum resources available to public safety. Portions of the unused spectrum in the 746 to 806 MHz band (TV channels 60-69) also may be reassigned as a result of recent Public Safety Wireless Advisory Committee efforts. The State should monitor closely federal spectrum re-allocation activities and be prepared to take advantage of any new available spectrum.

Obtaining this additional spectrum in the current era of increased competition will not be an easy task. Agencies that can demonstrate a strong plan for the use of new frequencies, funding availability and a commitment to shared use and spectrum efficiency will be considered first for new spectrum allocations.

In addition to any new spectrum allocations, the State should continue to utilize existing VHF high band frequencies from 150 MHz to 174 MHz to leverage current infrastructure and to support wide-area interoperability. Frequencies in the 800 MHz range also will continue to provide for special applications. While VHF and UHF spectrum are well-suited for the majority of public safety operations, localized operations such as correctional institutions require the strong in-building penetration characteristic of 800 MHz frequencies.

Spectrum Efficiencies

More efficient use of spectrum can be achieved through a migration to currently available spectrum efficient technologies. Narrower channels, digital transmission and trunking approaches have the potential to dramatically increase the number of users that can be supported by a single channel. Additionally, system sharing can provide the opportunity to more efficiently utilize limited radio frequencies.

System Expandability

Public safety systems demand flexibility and quick expandability to accommodate peak use. Although normal day-to-day operations may not require high capacity, during peak operations or disaster situations many new users may come on the system simultaneously. This is especially true of emergency management and disaster services, which are characterized by very low levels of voice traffic during routine operations, but extremely high levels during a major event such as an earthquake, flood or wildland fire.

In addition, California requires expandability to accommodate future demand patterns. The State's existing communication systems support over 43,000 public safety radio users. Over the next 10 years, this number is expected to steadily increase to over 51,000 users. In particular, there is the potential for the Department of Corrections to nearly double the number of its current radio users by 2006. Any future communication system must be capable of accommodating this steady growth in personnel.

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These goals for public safety radio communications define a vision of a safer, healthier and more prosperous California made possible through enhanced public safety service delivery.

Competing Paradigms

There are several alternative paradigms to improving the State's radio communication systems. The State can choose to continue its present individually developed and funded departmental radio operations, or the State can elect to meet its strategic goals for public safety radio by making significant investments in communication infrastructure.

The Current Paradigm

California can choose to do nothing differently than it is doing today. Each of the State's public safety agencies currently work with the Department of General Services to operate and maintain independent, and often duplicative radio systems. Minimal Infrastructure and equipment investments are made as they can be afforded, grants are awarded, funding can be "borrowed" from other budget items, or as disaster funding becomes available.

Significant investment is required to rescue deteriorating systems

The most significant advantage of this first option is that it represents the lowest cost alternative. In fiscal year 1996-97, California's 10 largest public safety agencies will spend $75.3 million on public safety radio communications. Of this amount, approximately $28.2 million will be spent on capital costs including required equipment replacement and microwave system upgrades. Another $12 million will be spent on equipment maintenance, repair, parts and services. Technical design and engineering support will account for $13.7 million, and technician services for installation will total nearly $7 million. Miscellaneous parts and materials, private sector contracts and other flow-through costs will account for another $8 million. The final $6.4 million will be spent on microwave transmission services, including engineering, maintenance, installation, test and replacement equipment, vault rental and depreciation.

Current Baseline Costs (Fiscal Year 1996-97)	
One-Time Costs	
Replacement Equipment [2]	$20,000,000
Microwave Upgrade [3]	8,235,136
Total One-Time Costs	***$28,235,136***
Recurring Support Costs	
Unit Costs [4]	$12,000,000
Engineering [5]	13,707,533
Technician Services [6]	6,976,775
Miscellaneous Flow-Through [7]	7,955,000
Microwave Services [8]	6,439,381
Total Recurring Support Costs	***$47,078,689***
Total Costs	***$75,313,825***

Based on historical expenditures, it is anticipated that one-time capital costs would remain constant at approximately $20 million annually over the next 15 years. Microwave upgrade expenditures through fiscal year 2003-04 will total an additional $43.8 million. Annual recurring support costs will vary according to increasing maintenance costs for aging equipment, fluctuating demand for engineering and technician services, and changing flow-through costs. As a result, the total 15-year costs for continuing baseline operations are estimated at $1 billion.

Even at this level of expenditure though, the State of California still will have inadequate communication systems that no longer support the most fundamental needs of public safety agencies. Lack of interoperability, channel congestion, imminent obsolescence and limited functionality inhibit California from meeting its goals for public safety communications with existing radio systems. Increasingly, field personnel are put in life-threatening circumstances with no reliable communications. Public safety is compromised as a lack of interoperability translates into delayed response times to emergency incidents. Simply upgrading existing systems which are bordering on obsolescence and unable to accommodate future growth, would entail major expenditures without concomitant benefits.

It is clear that significant investments in radio technology, infrastructure and user

[1] As provided by Department of General Services, Telecommunications Division.
[2] Includes only minimum replacement of aged equipment.
[3] Includes additional microwave links and migration to digital. Costs are planned to continue through FY 2003-04.
[4] Includes preventative equipment maintenance, repair, parts and 24-hour, 7-day on call service. Also includes support for resolving interference problems.
[5] Includes technical design and engineering support for new, replacement and modification of existing systems. Engineering costs are charged to departments based on a pro-rata percentage.
[6] Includes VHF installation and maintenance. May also include services for tape recorders, lightbars, sirens and miscellaneous VHF radio equipment.
[7] Includes parts, materials and private sector contracts.
[8] Includes engineering, maintenance, installation, test and replacement equipment, vault rental and depreciation.

equipment are required to rescue California's deteriorating communication systems.

A Modified Paradigm

A second option would be to modify the current paradigm and increase expenditures to meet the minimum requirements of state public safety agencies independently. Procurements and systems development would require funding each agency independently to replace aging and obsolete voice system infrastructure, procure additional equipment necessary to equip those field officers currently without radio communications, and implement statewide mobile data capabilities. It is anticipated that approximately $3 billion over 15 years would be needed to meet these minimum requirements. This estimate is based upon detailed needs assessments for the 10 agencies, and a preliminary cost analysis of currently available technology solutions. It does not assume any particular vendor solution, spectrum band or detailed system design.

The high cost of continuing independent investment exceeds agency resources

The most significant advantages of this second option include minimal disruption to current operations and continued autonomy within multiple, single-agency systems; however, the high cost of continuing a paradigm of independent procurement and development exceeds agency resources. Additionally, each of the agencies would face the challenge of acquiring additional spectrum without demonstrating to the Federal Communications Commission a commitment to shared systems or use of radio frequencies. It is unlikely the required spectrum could be acquired through these independent pursuits.

A Paradigm Shift

Shared public safety communication systems require a significant shift in paradigm, and a highly coordinated effort among the State's public safety agencies. This paradigm shift represents a dramatic departure from today's approach to public safety communications. While it will require new organizational structures and modified operational procedures to support it, this third option offers several significant advantages.

First, shared communication systems provide the most reliable means of achieving direct interoperability among multiple agencies. Second, larger numbers of users make implementing enhanced features such as mobile data more cost effective. Next, demonstrating to the Federal Communications Commission a commitment to shared systems and efficient use of frequencies will increase California's chances of acquiring additional spectrum resources. Finally, shared systems offer greater opportunities to achieve cost efficiencies through the reduction of duplicate infrastructure, streamlined maintenance and greater leverage in equipment procurements.

It is difficult to estimate accurately the magnitude of these cost efficiencies without assuming a specific technology solution and system design. Cost savings will be dependent upon how effectively California is able to implement this strategy.

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Shared systems offer greater opportunities to achieve cost efficiencies

California can achieve significant cost efficiencies in addition to improved interoperability, enhanced functionality and increased capacity by changing the current paradigm of independent procurement and development of radio systems. Coordinated investments in public safety communications can provide California with a cost effective means to meet critical requirements.

A Strategy for the Future

Meeting California's goals for public safety radio communications, and realizing the vision defined in this Strategic Plan, begins with a strategy that will guide future decision-making. The strategy of California's 10 participating agencies is founded on a commitment to partnership. Only through strong partnerships will the State's vision for radio communications become possible. State agencies, private industry and local public safety agencies will all play significant roles in California's future public safety communications environment.

Partnership Among State Agencies

Even the largest agencies can no longer afford comprehensive communication solutions alone. The partnership among state agencies that was established with this collaborative strategic planning effort must be maintained to achieve strategic advantages in the future.

This partnership will be defined by making significant, coordinated investments in a shared public safety communication system. The system will be designed to consist of multiple voice and data networks optimized to meet the unique requirements of the 10 participating agencies as well as their common requirements. These sub-systems may utilize multiple technologies and spectrum bands, leveraging wherever possible the existing infrastructure investments. They will be integrated from an operational perspective into a single system to achieve greater levels of interoperability and provide a consistent level of capability to the State's public safety professionals.

Partnership with Private Industry

In September 1995, Governor Wilson directed all state agencies to inventory their core competencies and identify those government services that could be provided more effectively if outsourced to private industry. In February 1996, all state agency secretaries and department directors received *California Competes*, a workbook designed to assist in identifying which government services could be performed "better, faster and cheaper" by the private sector. In *California Competes*, only those services in which "direct control is critical for public health and safety...that the private sector cannot or does not provide...[or that government] provides more cost effectively" should be retained by government agencies.

Even the largest state public safety agencies cannot afford comprehensive communication solutions alone

While no private provider cost effectively offers the level of reliability, statewide coverage, priority access and security that California's state agencies require from their primary communication systems, commercial services can and do play an important role as an adjunct to public safety communications. Commercial services, including cellular and paging, will continue to provide public safety personnel with added flexibility and cost effective solutions to secondary communication requirements.

Partnership with Local Public Safety

Californians will benefit from more efficient, coordinated emergency response only when public safety at all levels of government can effectively communicate during daily operations as well as major disasters. This will require a strong partnership among state and local public safety agencies. The State of California can support interoperability with local agencies by continuing to maintain state mutual aid radio systems, and providing gateway capabilities to selected local systems. In addition, although the new shared system will be optimized to meet state agency requirements, there may be future opportunities for local agencies to share in the use of the system.

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Partnering to implement shared multi-agency radio systems will effectively prepare California for the public safety communication challenges and demands of the 21st century.

Recommendations

California's strategy to develop a shared, statewide public safety radio system represents a dramatic departure from what exists today. The following recommendations for systems and technology, administration and ownership, maintenance and support services, and organization and staffing are designed to provide a tactical plan for implementing this strategy.

Systems and Technology

1. Develop a Shared, Statewide Voice Radio System

   The State of California should move quickly and decisively to begin the implementation of a shared, statewide public safety voice radio system. The system should be designed to consist of multiple voice networks optimized to meet the unique requirements of the 10 participating agencies. These sub-systems may utilize multiple technologies and spectrum bands, leveraging wherever possible existing infrastructure investments. They should be integrated into a single system to achieve greater levels of interoperability from an operational perspective, and provide a consistent level of capability to the State's public safety professionals. A shared system offers the best opportunity to improve interoperability among the agencies during emergencies and disasters, as well as to support day-to-day operations. It is also the most cost effective way to obtain enhanced functionalities, and the most effective way of pursuing new spectrum allocations.

2. Develop Statewide Mobile Data Capabilities

   The State should implement a statewide mobile data communication infrastructure for shared use by the 10 agencies. This system would support high priority, rapid response data transmissions such as database inquiries, automatic status updates, electronic messaging, field reporting, interface with computer aided dispatch systems and emergency alerting.

3. Collectively Pursue Additional Spectrum Resources

   The State should begin immediately to collectively pursue allocations for sufficient spectrum to support a shared statewide network. By demonstrating a commitment to the shared use of frequencies, California can more persuasively argue for additional spectrum. Unused UHF television channels currently offer one potential opportunity for new spectrum allocations. The State should closely monitor federal spectrum re-allocation activities and be positioned to take advantage of any new spectrum that becomes available to public safety.

4. Optimize Spectrum Efficiency and Enhance Interoperability

   The new system configuration should be designed to optimize spectrum efficiency and performance through the coordinated migration to narrowband and digital technologies. The latest technologies available for public safety wireless voice communications, such as trunking, should be implemented consistently among the agencies in select areas of the State to enhance cost effectiveness and interoperability.

5. Pursue Phased Implementation

   The State should transition to its targeted communications environment in phases. Each completed phase of the system implementation should provide a complete and functional portion of the eventual communication infrastructure. A phased implementation can accommodate changes in time frames, agency requirements and technology without requiring a comprehensive re-engineering of the system. A first phase may be the implementation of a pilot project consistent with the system vision to provide a proof of technical concept. This pilot could also serve to confirm cost estimates and establish the project management organization.

6. Coordinate New Voice Radio System with Existing Mutual Aid Systems

   Federal, state and local public safety agencies rely heavily on the State's existing mutual aid radio systems. Any new statewide system should provide for continued interoperability with these mutual aid systems.

7. Continue to Accommodate Specialized Requirements

   Each of the 10 agencies will continue to have specialized radio communication requirements which can be met most effectively on a case-by-case basis using alternative spectrum and technological approaches. Video communications, telemetry and surveillance are examples of these specialized requirements which the State's target communications environment is not specifically designed to accommodate.

8. Utilize Commercial Services to Meet Unique Requirements

   Commercial communication services will continue to play an important role as an adjunct to public safety communications. The State should continue to utilize commercial providers where those services meet requirements most cost effectively. Cellular telephone communications, paging services, high volume data applications and satellite communications are all examples of telecommunications capabilities that can be effectively provided by commercial providers.

Administration and Ownership

1. Maintain State of California System Ownership

   The State should continue to maintain primary ownership of its radio communication assets. No commercial provider currently offers the level of performance, reliability, coverage, priority access, security and affordability that the State's public safety agencies require. While many new enterprises are forming which hold promise for commercially provided services, in today's environment a user-owned system currently offers the most cost effective approach to meeting the State's public safety requirements. The State, however, should continue to periodically re-evaluate the commercial and private sector for future outsourcing opportunities.

2. Pursue Design and Installation Partnership

   The Department of General Services should pursue partnership opportunities with system providers during the design and installation phases of the project. During the design phases, department engineers will provide knowledge of existing systems and conditions; in turn, vendor engineers will begin the knowledge transfer that will allow the Department to assume system maintenance and engineering responsibilities. During the installation phases, Department employees will be able to monitor installation practices and become familiar with the installed equipment; vendor installation teams will be able to leverage the State's knowledge of sites and facilities, and be able to utilize the State's existing manpower resources.

3. Maintain Planning Committee as an Advisory Body to the Department of General Services

   The Public Safety Radio Strategic Planning Committee should continue to play an active role in advising the Director of General Services on strategic direction, system administration, user requirements and priority setting for public safety radio communications. The Planning Committee should be comprised of representatives from the user agencies as well as the Telecommunications Division. The Committee will have its greatest impact during the transition to the State's target environment as issues of migration, standards and system administration are encountered. The Committee should continue to provide a forum for ongoing collaboration and interagency coordination.

4. Coordinate Site and Facility Management and Develop Standards

   The State's public safety agencies should continue to work together in coordination with the Department of General Services to develop radio site and facility standards. Identification and standardization of facility requirements will help ensure the availability and performance of remote sites. As the design and implementation of the replacement radio systems proceed, site consolidation, as well as remodeling or new site development, likely will become a critical path implementation task.

5. Maintain User Agency Administrative Control

   User agencies should retain responsibility for some aspects of administrative control over radio systems. Specific tasks such as key control for encrypted communications will require this direct administration for security and accountability.

Maintenance and Support Services

1. Continue to Provide Maintenance through Department of General Services Telecommunications Division

   The State should retain primary responsibility for the maintenance of the State's radio communication system within the Department of General Services Telecommunications Division. The Division's cost effective responsiveness to client requirements has been demonstrated consistently during recent years. The State should continue to outsource the maintenance of system components when their complexity or proprietary nature requires specialized expertise, and where it can be demonstrated private service providers can cost effectively meet the State's standard of performance. In some cases, it may be more cost effective for the State to acquire the necessary expertise and support the technology internally.

2. Provide DGS Staff with Ongoing Training and Updated Equipment

   Internal engineering and maintenance staff should be provided adequate training and equipment to keep pace with changes in technology. The ability to provide support on a statewide basis to these critical public safety radio systems is essential to their reliability and overall performance.

3. Extend Standard Practices for Vendor Installation.

   The State should expand its standard practices for equipment installation and require vendors to perform installation work based on these standards. To ensure compliance, installation standards should be included in the acceptance criteria for completed work.

4. Expand Efforts to Pursue Public Safety Communication Interests

   The State should take advantage of growing opportunities to elevate public safety communications on both local and national agendas. The State should take a proactive role in promoting public safety communication needs to achieve the necessary interoperability at local and federal levels. The State should continue to actively represent the State's public safety interests in state and national planning forums and before legislative and regulatory bodies.

5. Pursue Improvements in the Procurement Process

   The existing processes for procuring public safety radio equipment and services are inadequate. Bid processes and current contract procedures lead to time delays, increased costs and less-than-optimal technological solutions. The State should pursue improvements in the procurement processes aimed at reducing the cycle time of equipment and service selection. Existing master purchasing agreements have proven successful in streamlining the process for procuring equipment and services in other areas. The State should also pursue increased flexibility to focus vendor selection on operational requirements and interoperability with existing infrastructure. Finally, the State should seek performance-based contracts with vendors to help ensure technology solutions meet these operational requirements.

6. Implement Formal Project Tracking Procedures

   The State should immediately implement formal, automated procedures for tracking projects and work orders. These procedures and tools should track planned and actual project costs and schedules and provide a basis for further planning and cost estimation efforts.

Organization and Staffing

1. Appoint a Full-time Project Manager and Provide Support Resources

   To provide accountability and coordination, the State should identify a dedicated, full-time project manager for the design and implementation of the shared systems. The project manager would be responsible for the expeditious progress and success of the project and provide regular status updates to the Planning Committee. The project manager should be provided with the necessary staff and technical resources to accomplish the required oversight.

2. Establish Ad Hoc Task Forces to Address Critical Path Issues

   Temporary task forces with user agency representation should be formed as necessary to complete specific tasks during the system design and implementation. The State should immediately establish task forces within the Planning Committee to address Funding, Spectrum Acquisition, System Design and Procurement, and Public Relations tasks.

3. Identify Required Agency Resources

   Participating agencies should be prepared to allocate substantial time and internal resources to this project. User agency participation in design and implementation is critical to ensuring that the unique requirements of the agencies are met. It is anticipated that each agency representative on the Planning Committee will continue to participate in committee meetings and on task forces. Additional resources from each agency will be required to assist Planning Committee members with ongoing implementation tasks as necessary.

4. Identify Required Department of General Services Resources

   Department of General Services resources will likely be involved in various ad hoc project task forces and continue to participate in Planning Committee activities. The Department's Telecommunications Division will also take a lead role on an ongoing basis for maintenance and support services. Specific resource requirements should be quantified early and options for meeting these requirements with a combination of existing and outside resources identified. The State may wish to consider allocating the required resources to a dedicated organizational unit within the Telecommunications Division to focus on supporting the implementation and transition to the State's radio communications vision.

5. Retain Outside Assistance

   Specialized legal, technical, design, quality assurance, financial and project management skills may be necessary during system design and implementation. The State should retain the appropriate external professional assistance to supplement current staffing and to provide specialized expertise as required.

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Each of these recommendations is targeted at achieving enhanced functionalities and increased efficiencies in public safety radio. Taken together, they establish the road-map by which California can realize its strategy for shared public safety communications.

Critical Success Factors

There are several factors critical to the success of the strategic vision outlined in this Plan. To ensure success the State must:

- ***Commit to Long-Term Interagency Participation.*** Each of the 10 participating agencies must demonstrate a solid commitment to continuing interagency cooperation and integrated planning.

- ***Establish Long-Term Funding.*** California's vision for public safety radio leverages significant investments in current infrastructure. In addition, a phased migration to shared systems requires the ongoing maintenance of existing systems until they are upgraded or replaced. For both of these reasons, current systems must be maintained at a level that will enable them to support the state agencies' missions. New shared system infrastructure will require additional long-term funding.

- ***Redefine Role of Department of General Services Telecommunications Division.*** The Department of General Services Telecommunications Division must fulfill an expanded role of client advocate for its user agencies. Externally, the Telecommunications Division will be required to support efforts to represent the State's interests in national forums. Internally, the Division will be directly accountable to user agencies for communicating progress and managing projects on time and within budget.

- ***Establish Processes for Requirements-Driven Justification.*** New technologies must demonstrate an ability to cost effectively meet specific operational requirements before their adoption. User agencies will evaluate the effectiveness of implemented solutions in meeting their unique needs.

- ***Provide Comprehensive Training.*** The introduction of new technologies will require training for both end users and support staff to keep up with the pace of technology and fully utilize the capital investments.

- ***Update Operational Processes and Procedures.*** New or revised procedures will be required as new opportunities for interoperability alter daily operations and many tasks become automated with the implementation of mobile data and other technologies.

- ***Continue Operational Autonomy and Flexibility.*** Participating agencies will continue to require autonomy in their daily operations. Interoperability should not come at the expense of cumbersome rules or configuration constraints which limit individual agency initiatives. In addition, the agencies will require enough flexibility in the procurement and implementation processes to target open architectures and integrate new technologies as they become available.

- ***Seek Opportunities for Local Participation.*** The State's vision provides a platform to meet global public safety agency interoperability requirements. The ability to gain local support for the project will become a cornerstone of its success.

- ***Leverage National and Other State Efforts.*** Several national and state initiatives for emergency communications systems and use of satellite technology may provide additional leverage and cost efficiencies.

- ***Continuously Communicate Project Goals and Risks.*** Building support for the project will require broad communication of anticipated benefits as well as a realistic portrayal of potential risks. In addition, the ongoing status of this multi-year project must be continuously disseminated to continue its momentum.

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These success factors lay the foundation for California's next steps.

Action Plan

To seize the narrowing window of opportunity, California must take decisive action to pursue a shared communication infrastructure and acquire additional spectrum allocations. The following steps, taken over the next 18 months, will establish a firm direction for the future of public safety radio in California. They are the first steps to ensuring radio communication continues to effectively support the delivery of public safety services.

1. Communicate the Strategic Plan to Stakeholders. The Planning Committee should begin to communicate the Strategic Plan to participating agency executives and staff as well as the Governor's Office, Legislature and the Department of Finance in an effort to build early support for the project. Specific work steps should include:

    - Coordinate the publication and distribution of the Plan
    - Develop and conduct department and internal executive briefings

2. Prepare Feasibility Study Report (FSR). The State should conduct a cost analysis and feasibility study of system design alternatives. Specific work steps should include:

    - Finalize detailed requirements
    - Conduct detailed alternatives analysis
    - Prepare cost analysis of alternatives
    - Determine most feasible alternative
    - Develop management plan
    - Prepare Feasibility Study Report

3. Pursue Spectrum Allocations. Additional discussion with the Federal Communications Commission and frequency coordinators should take place to finalize spectrum allocation requirements and identify any future design constraints. Specific work steps should include:

- Coordinate with the Federal Communications Commission, frequency coordinators, and appropriate industry associations
- Monitor relevant PSWAC and FCC developments
- Develop license application, detailing specifics of spectrum use, migration strategy and build-out commitment

4. Develop a Funding and Finance Strategy. Successful migration to the State's vision will require significant investments in system infrastructure. The Planning Committee and the Department of General Services should identify the most appropriate sources of capital funding and finalize financing arrangements for the system. Specific work steps should include:

    - Identify Department of Finance requirements
    - Finalize detailed budget projections
    - Identify capital funding sources
    - Draft preliminary cost allocations
    - Identify agency capabilities and support
    - Identify financing options

    Successfully acquiring additional radio frequency spectrum in this era of increased competition will require, in part, a demonstration of funding commitment.

5. Review Evolving Committee Role and Responsibilities. The existing Strategic Planning Committee has provided an effective forum in which user agencies participate directly in ongoing planning efforts. The Committee should continue to advise the Department of General Services in functional system design, spectrum acquisition, funding strategy development and system selection documentation. As this project progresses from detailed planning to implementation phases, the Committee should review its role and responsibilities. It is anticipated that the Committee will evolve to a more formal governance structure as system implementation demands more formal procedures for introducing new system users, assigning cost allocations, resolving disputes and prioritizing new and changing system requirements.

6. Finalize System Design and Prepare Specifications. The State should develop a comprehensive Request For Proposal (RFP) to begin the procurement of the new voice and data radio communication systems. The scope of the RFP should include detailed needs and requirements as well as minimum system performance standards. Specific work steps should include:

    - Finalize detailed operational requirements and specific criteria for performance, equipment, and testing and acceptance
    - Finalize system features and equipment quantities

- Develop contractual terms and conditions
- Draft Request for Proposal

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The State of California faces a clear challenge to replace its aging, nearly obsolete public safety communication systems. In an unprecedented collaborative effort to meet this challenge, California's 10 largest public safety agencies partnered to create a shared strategic vision and define a roadmap for the future. This roadmap will direct California into a new century with enhanced public safety services supported by effective, reliable mobile radio communications.